



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,888	08/27/2002	Marc Schaepkens	RD-28694	7966

6147 7590 09/18/2006

GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/064,888

Applicant(s)

SCHAEPKENS ET AL.

Examiner

Maureen G. Arancibia

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-75 is/are pending in the application.
4a) Of the above claim(s) 59-75 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-58 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 30 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 17-23, 26, 27, and 29-32 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 4,780,591 to Bernecki et al. (hereafter Bernecki).

In regards to Claim 17, Bernecki teaches a plasma source for generating a substantially controllable plasma, comprising: a plasma chamber (indicated at 28, 63) in which said plasma is generated; an anode 24D disposed at a first end of said plasma chamber, said first end having an exit port 53 through which said plasma exits said plasma chamber; an adjustable cathode 22 disposed in the plasma chamber, wherein the adjustable cathode is movable to establish a gap between the anode and the adjustable cathode (Column 5, Lines 41-59); a power source 23 coupled to the anode and adjustable cathode for providing a voltage across the anode and adjustable cathode (Column 3, Lines 62-68); a plasma gas inlet 72 for introducing a plasma gas from a plasma gas source into the plasma chamber at a plasma gas flow rate (Column 5, Lines 21-30); and a sensor 148 for detecting and monitoring conditions within said plasma chamber. (Column 10, Lines 64-67) (Figure 1a) Sensor 148 is integral to the plasma chamber, *as broadly recited in the claim*. (See Response to Arguments below.)

In regards to Claims 18-20, Bernecki teaches a pressure adjustment means coupled to the adjustable cathode 22 for moving the adjustable cathode, comprising a pressure plate 124 and pneumatic drive 108, as broadly recited in the claims. (Figure 1b, attached with the Certificate of Correction dated 25 October 1988; Column 6, Line 49 - Column 7, Line 14)

In regards to Claim 21, Bernecki teaches an alternate embodiment of the plasma source, which comprises all of the features recited in Claim 17 (see Figure 3a; Column 7, Lines 41-45), in which a screw feed 430 is coupled to adjustable cathode 222 for moving the adjustable cathode. (Column 10, Lines 19-30; Figure 3b)

In regards to Claims 22 and 23, adjustable cathode 222 may be considered a wire, as broadly recited in the claims, and screw feed 430, which is coupled at adjustable cathode 222 for moving it, may be considered a wire feed in that it feeds the cathode into the plasma chamber.

In regards to Claim 26, Bernecki teaches that the sensor 148 is a voltage sensor disposed in an electrical circuit between the power source 23 and the cathode 22. (Column 10, Lines 64-66; Figure 1a) Bernecki also teaches a current sensor. (Column 11, Lines 54-55)

In regards to Claim 27, the power source is a DC power source. (Column 3, Lines 67-68)

In regards to Claims 29 and 30, the plasma gas inlet from gas source 64 can comprise an independent mass flow controller. (Column 6, Lines 44-46)

In regards to Claim 31, Bernecki teaches a control system 150 for moving the adjustable cathode 22, wherein the control system is coupled to the sensor 148, the power source 23, and the adjustable cathode 22, wherein the controller receives an input on the conditions in the plasma chamber and moves the adjustable cathode to establish a predetermined gap between the anode 24D and the adjustable cathode 22 based on the input. (Column 10, Line 62 - Column 11, Line 66)

In regards to Claim 32, the voltage across the anode 24D and adjustable cathode 22 is adjustable by adjusting the position of the cathode. (Column 11, lines 7-14)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 24, 25, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernecki in view of U.S. Patent 5,204,145 to Gasworth.

In regards to Claims 24 and 25, Bernecki does not expressly teach a pressure sensor in fluid communication with the plasma chamber and comprising a transducer.

Gasworth teaches a pressure sensor comprising a transducer 38 in fluid communication with a plasma chamber of a plasma source 1 via second chamber 2. (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Bernecki to provide a pressure sensor comprising a transducer in fluid communication with the plasma chamber, as taught by Gasworth. The motivation for making such a modification, as taught by Gasworth (Column 5, Lines 3-10), would have been to allow the pressure of a second chamber into which the plasma from the plasma source flows to be monitored and maintained (i.e. in response to the influx of plasma from the plasma source).

In regards to Claim 28, Bernecki does not expressly teach that the power source provides up to 100 A of current at 50 V.

Gasworth teaches a variable power source 28. (Column 4, Lines 36-38)

It would have been obvious to one of ordinary skill in the art to modify the power source taught by Bernecki to be variable, as taught by Gasworth. The motivation for doing so, as would have been within the knowledge of one of ordinary skill in the art, would have been to increase the process range of the plasma source.

The variable power source taught by the combination of Bernecki and Gasworth, combined with the adjustable cathode taught by Bernecki, would be structurally capable of providing up to 100 A of current at 50 V, based on the position of the adjustable cathode and the settings of the variable power source. It has been held that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex*

parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) This rejection is based on the fact the apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

5. Claims 1-5, 8, 9, 11-14, 16, 33-42, 45, 46, 48-56, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernecki in view of U.S. Patent 6,267,074 to Okamura.

The teachings of Bernecki were discussed above.

In regards to Claims 1, 2, 5, 14, 33, 34, and 56, Bernecki does not expressly teach a second pressure-controlled chamber in fluid communication with the plasma chamber through the exit port of the plasma chamber, such that the plasma flows from the plasma chamber into the second chamber through the exit port to plasma treat the surface of an article disposed in the second chamber, or providing at least two of the plasma sources.

Okamura teaches that the plasma chambers 22 of a plurality of plasma sources are provided in fluid communication with a second, pressure-controlled chamber 13 (Column 11, Lines 28-33), such that plasma flows from the plasma chambers into the second chamber through the exit ports 14 of the plasma sources to plasma treat the surface of an article 1 disposed in the second chamber. (Figures 1 and 5)

It would have been obvious to one of ordinary skill in the art to provide a plurality of the substantially controllable plasma sources taught by Bernecki such that the

plasma chambers of the plasma sources are in fluid communication with a second, pressure-controlled chamber, the plasma flowing from the plasma chambers into the second chamber to plasma treat the surface of an article disposed in the second chamber, as taught by Okamura. The motivation for making such a modification, as taught by Okamura (Column 4, Line 42 - Column 6, Line 11), would have been that such a system for processing an array of plasma sources can aid in producing a uniform plasma to process large-sized substrates.

The system taught by the combination of Bernecki and Okamura would be structurally capable of producing expanding thermal plasmas from the plasma sources (the plasmas must necessarily expand into the second chamber, which would cause a thermal change to the plasmas); of maintaining the second chamber at a lower pressure than the pressure in the plasma chamber(s) (by the pressure control of the second chamber); and of adjusting the pressures in the plasma chambers of first and second plasma sources (by adjusting the flow rate of the plasma-generating gas into each of the plasma chambers). It has been held that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) This rejection is based on the fact the apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a

rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claims 3, 4, 35, and 36, see the discussion of Claims 29 and 30 above.

In regards to Claims 8 and 45, see the discussion of Claim 26 above.

In regards to Claims 9 and 46, see the discussion of Claim 27 above.

In regards to Claims 11-13 and 49-51, Bernecki teaches that an exit port of the plasma source comprises an orifice 63 formed in anode 24D and a floating cascade plate 16 (electrically isolated from the anode). (Figure 1a; Column 4, Lines 50-60) The floating cascade plate 16 is a floating wall of the plasma chamber indicated at 28, 53, 63 as broadly recited in the claims. (Figure 1a)

In regards to Claims 16 and 58, the voltage across the cathode and anode in each of the plasma sources is individually adjustable by moving the cathode, as taught by Bernecki. Therefore, the voltage across the cathode and anode in the first plasma source would be structurally capable of being adjusted with respect to the voltage across the cathode and anode in the second plasma source. It has been held that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) This rejection is based on the fact the apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. When a rejection is based on

inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claims 37-42, see the discussion of Claims 18-23 above.

In regards to Claim 48, see the discussion of Claim 31 above.

In regards to Claims 52-55, the system taught by the combination of Bernecki and Okamura would be structurally capable of producing the recited pressures in the plasma chamber (by adjusting the flow rate of the plasma-generating gas into each of the plasma chambers) and in the second chamber (by the pressure control of the second chamber). It has been held that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) This rejection is based on the fact the apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

6. Claims 6, 7, 10, 15, 43, 44, 47, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernecki in view of Okamura as applied to claims 1, 9, 14, 33, 46, and 56, and further in view of Gasworth.

In regards to Claims 6, 7, 43, and 44, the combination of Bernecki and Okamura discussed above does not expressly teach a pressure sensor in fluid communication with the plasma chamber and comprising a transducer.

Gasworth teaches a pressure sensor comprising a transducer 38 in fluid communication with a plasma chamber of a plasma source 1 via second chamber 2. (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Bernecki and Okamura to provide a pressure sensor comprising a transducer in fluid communication with the plasma chamber, as taught by Gasworth. The motivation for making such a modification, as taught by Gasworth (Column 5, Lines 3-10), would have been to allow the pressure of a second chamber into which the plasma from the plasma source flows to be monitored and maintained.

In regards to Claims 10 and 47, the combination of Bernecki and Okamura does not expressly teach that the power source provides up to 100 A of current at 50 V.

Gasworth teaches a variable power source 28. (Column 4, Lines 36-38)

It would have been obvious to one of ordinary skill in the art to modify the power source taught by the combination of Bernecki and Okamura to be variable, as taught by Gasworth. The motivation for doing so, as would have been within the knowledge of one of ordinary skill in the art, would have been to increase the process range of the plasma source.

The variable power source taught by the combination of Bernecki, Okamura, and Gasworth, combined with the adjustable cathode taught by Bernecki, would be structurally capable of providing up to 100 A of current at 50 V, based on the position of the adjustable cathode and the settings of the variable power source. It has been held

Art Unit: 1763

that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) This rejection is based on the fact the apparatus structure taught above has the inherent structural capability of being used in the manner intended by the Applicant. When a rejection is based on inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

In regards to Claims 15 and 57, the combination of Bernecki and Okamura does not expressly teach at least one gas injector disposed in the second chamber proximate to the exit ports of each of the plasma sources to direct a gas into the plasma.

Gasworth teaches a gas injector 32 disposed in a second chamber 2 proximate to the exit port of a plasma source 1 to direct a gas into the plasma. (Figure 1; Column 4, Lines 60-63)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Bernecki and Okamura to include at least one gas injector disposed in the second chamber proximate to the exit ports of each of the plasma sources to direct a gas into the plasma, as taught by Gasworth. The motivation for doing so, as taught by Gasworth (Column 6, Lines 23-65), would have been to add an additional reactant to the plasma to form a chemical vapor deposition product for coating the article to be processed (as recited in the claim).

Response to Arguments

7. Applicant's arguments filed 30 June 2006 have been fully considered but they are not persuasive.

Specifically, Applicant argues that sensor 148 taught by Bernecki et al. is not integral to the plasma chamber, as recited in independent claims 1, 17, and 33 as amended. The Examiner must disagree. As Applicant points out, one must look to the instant disclosure for support for the amendment reciting that the sensor is integral to the plasma chamber. As indicated in both Figure 1 and Paragraph 28, sensor 116 can be in either fluid communication with the plasma chamber (ex. a pressure sensor) or in electrical communication with the plasma chamber (ex. a voltmeter or an ammeter). The Examiner further notes that dependent claims 8, 26, and 45 in fact recite that the sensor "includes one of a current sensor and a voltage sensor *disposed in an electrical circuit between [the] power source and [the] adjustable cathode.*" It follows that the phrase "integral to the plasma chamber" cannot be narrowly interpreted to mean only a sensor interior to the plasma chamber or in fluid communication with the plasma chamber, or to necessitate a specific spatial relationship between the sensor and the plasma chamber, but rather must be broadly interpreted to include sensors in electrical or other forms of communication with the plasma chamber. The teachings of Bernecki et al. meet this limitation.

In regards to Applicant's argument that the pressure sensor of Gasworth is not integral to a plasma chamber, the Examiner must again disagree. Gasworth expressly teaches a pressure sensor comprising a transducer 38 in fluid communication with a

Art Unit: 1763

plasma chamber of a plasma source 1 via second chamber 2. (Figure 1) Transducer 38 would thereby monitor conditions within the plasma chamber of plasma source 1 indirectly, as broadly recited in the claims, by direct measurements within communicating chamber 2.

Conclusion

8. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Maureen G. Arancibia
Patent Examiner
Art Unit 1763



Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763